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AUTHOR	Bell, Larry G.
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ABSTRACT

A study analyzed the forces affecting improvement and implementation of international agricultural perspectives in secondary programs of agricultural science in Texas. A mail survey, based on force-field analysis, was used to determine the effect of 14 variables, including 3 that involved perceptions of the relevance, knowledge, and implementation of 16 selected international perspectives. Eleven other variables measured the effect of forces on perceptions of relevance, knowledge, and the support for teaching those perspectives. The instrument was mailed to 310 agriscience teachers in Texas (one-fifth of such teachers in the state), and 120 usable surveys were returned. The study found that implementation ranges between somewhat adequately and inadequately and is subject to more restraining effects than driving effects. Path analysis determined that the variables with the strongest direct and indirect effect on implementation were knowledge of the perspectives, knowledge gained, personal relevance, and general support from all stakeholders. Forces contributing to lack of knowledge included the following: (1) failure to use high school instructional materials on international agriculture; (2) lack of emphasis on the importance of world trade in university-level agricultural education teacher-training programs and in-state secondary programs; and (3) no interaction between agriscience teachers and stakeholders to enhance teachers' awareness of economic benefits. Measurement error and low response rate limit the study. (Contains 81 references.) (KC)

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FORCES AFFECTING THE IMPROVEMENT AND IMPLEMENTATION OF INTERNATIONAL PERSPECTIVES IN SECONDARY LEVEL AGRICULTURAL PROGRAMS IN TEXAS

DEPARTMENT OF AGRICULTURAL EDUCATION

TEXAS A&M UNIVERSITY

COLLEGE STATION, TEXAS 77843

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FORCES AFFECTING THE IMPROVEMENT AND IMPLEMENTATION OF INTERNATIONAL PERSPECTIVES IN SECONDARY LEVEL AGRICULTURAL PROGRAMS IN TEXAS

A Summary Report of Research

By

Larry G. Bell

Department of Agricultural Education
Texas A&M University
College Station, Texas 77843-2116

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September 1999

FOREWORD

Are international perspectives being taught in secondary level programs of agricultural science? Are such perspectives emphasized in the curriculum? Is there concern about the topic among teachers, teacher educators, and other public and private sector stakeholders? What are the attitudes of teachers toward teaching international perspectives? What implications exist for action associated with the current level of international perspectives in the curriculum?

The research summarized herein by Dr. Larry G. Bell on forces affecting the improvement and implementation of international perspectives in secondary level programs of agricultural science in Texas provides insights, information, and guidance to teacher educators, personnel of the Texas Instructional Materials Service, personnel of the Texas Education Agency, officers and members of the Vocational Agriculture Teachers Association of Texas and all teachers of agricultural science, and other stakeholders in both the public and private sectors, such as the Houston Livestock Show and Rodeo and the Texas Department of Agriculture.

His findings should be examined carefully by both teacher educators and Texas Education Agency personnel in Texas as they consider the pre-service preparation needed by prospective teachers. His research also has implications for the content of graduate level courses and in-service programs for teachers. While particularly valuable to teacher educators in Texas, the findings and conclusions of his research also have implications for examination and action by teacher educators in other states.

Dr. Bell's use of force field analysis and path analysis plowed new ground in examining the forces at work that affect international perspectives in the curriculum. He is to be commended for the approach that he took to find the answers needed to achieve the objectives of the research. He also is to be commended for taking the next step beyond conducting the study to consider and develop strategies to enhance teachers' awareness and use of international perspectives based on findings and conclusions drawn.

For more information about the research, Dr. Bell may be contacted directly as follows: 407 Summer Court, Apt. B, College Station, Texas 77840, or phone (409) 696-7764, or e-mail him at Larry.G.Bell@usa.conoco.com. The complete study, which was research for his dissertation in the doctor of philosophy program in agricultural education, is on file in both the Evans Library at Texas A&M University and in the Department of Agricultural Education at Texas A&M University.

James E. Christiansen, Professor
Department of Agricultural Education
College of Agriculture and Life Sciences
Texas A&M University
College Station, Texas 77843-2116

September 9, 1999

TABLE OF CONTENTS

Page

ABSTRACT 1

INTRODUCTION 3

Statement of the Problem 4
Purpose and Objectives 7
Theoretical Base 8
Hypotheses 10
Research Questions 12
Significance and Contribution of the Study 13
Delimitations 16
Limitations 17
Assumptions 17

METHODOLOGY 17

Design of the Study 18
Population 18
Procedures 18
Instrumentation 19
Table 1. Sixteen International Perspectives 20
Data Analysis 21
Figure 1. Conceptual model of the directionality of effects between variables affecting the implementation of International perspectives in Texas secondary level agricultural programs 24
Table 2. Forces Affecting Knowledge Gained by Personal Initiative 26
Table 3. Tests of Significance and Path Coefficients for the Regression of Knowledge on Selected Independent Variables 28
Figure 2. Simplified path model of the effects of selected variables on implementation 30

CONCLUSIONS AND IMPLICATIONS, STRATEGIES, AND RECOMMENDATIONS 32

Findings Related to Specific Objectives 32
Conclusions and Implications 35
Figure 3. Force Field of Current Implementation 36
Figure 4. Topgraphic Representation of Force Field 38
Strategies 39
Recommendations for Future Study 42
Epilogue 43

REFERENCES 44

Forces Affecting the Improvement and Implementation of International Perspectives in Texas Secondary Level Agricultural Programs

Larry Gene Bell

ABSTRACT

[Keywords or descriptors are international agricultural education, secondary-level agricultural education, force field analysis, and path analysis.]

The purpose of this study was to analyze the forces affecting the improvement and implementation of international agricultural perspectives in the secondary programs of agricultural science in Texas. What is the current status of teaching such perspectives? What factors influence Texas agriscience teachers' willingness to integrate them into their local programs? What is the relative strength of each factor, the relationship between factors, and their impact on implementation?

Survey methodology, based on theoretical principles of force field analysis, was used to determine the effect of 14 main variables. Three variables involved perceptions of the relevance, knowledge, and implementation of 16 selected international perspectives. Eleven other variables measured the effect of forces on perceptions of relevance and knowledge and the support for teaching those perspectives. The population for the study was 1,515 agriscience teachers listed in the 1997-98 Directory of Texas Teachers of Agricultural Science. All surveys were mailed out in the last two weeks of May, 1998 and data from 120 surveys were collected and analyzed in the Fall of 1998. Path analysis was used to determine which variables had the greatest influence on implementation.

The mean score for implementation was 2.72 on a Likert-scale of five to one, which meant that implementation ranges between somewhat adequately and inadequately and is subject to more restraining effects than driving effects. The path analysis determined that the variables with the strongest direct and indirect effect on implementation (in order by relative strength) were knowledge of the perspectives, knowledge gained (by personal initiative, from stakeholders, and from teacher-training), personal relevance, and general

support from all stakeholders. Other forces related to relevance and support had no statistically significant influence on implementation.

Forces contributing to lack of knowledge included: 1) failure to utilize high school instructional materials on international agriculture published in Texas or elsewhere, 2) lack of an emphasis on the importance of trade via NAFTA and GATT in university-level agricultural education teacher-training programs and the secondary agricultural education program of the Texas Education Agency, and 3) virtually no interaction between agriscience teachers and stakeholders to enhance teachers' awareness of economic benefits.

INTRODUCTION

"Our students also know precious little about the cultures in other parts of the world. Contrary to what many believe, this knowledge is not a luxury suitable only for liberal arts students, or something that is interesting but of little practical value. It is the key to understanding how people in other countries think, and how they will react to initiatives from our side, either by the private or public sector" (Finley & Price, 1994).

A certain successful Texas manufacturer of processed foods felt he could sell his products in Europe. He contacted someone in France who expressed interest in the material, so he manufactured several tons of it and sent it over by plane. Several months later he was still trying to get payment for his products and had begun to tell everyone who would listen that they should never get involved in international trade.

On another occasion, a 17-year high school student had just finished disking a field to grow cotton, and was overheard to say, " I can hardly wait to get away from cotton! If I never see another bale of cotton in my life, it will be too soon!"

What did these two participants in the Texas agricultural sector have in common? They were both uninformed, neither had asked for appropriate guidance in their decision, and both were already forming opinions that could severely limit their (and others) future economic and cultural opportunities. They also represent the spectrum of misinformation and lack of information running through public agricultural education and on into private industry that inhibits Texas from becoming a world-class supplier of agricultural goods, equipment, and services. These examples illustrate the practical and tangible linkages between secondary agricultural education, cultural awareness, success in international trade, and the economic and social well being of the agricultural sector in Texas. For these linkages to become effective, however, considerable groundwork must be done to increase the awareness of the value of knowing more about international perspectives in the Texas agricultural sector.

It would be difficult to access the current adult generation of producers and processors with any kind of large-scale educational program of this nature. Studies in the last two decades suggest that the greatest number of future participants can be accessed most efficiently, and at the lowest cost, by improving and implementing international perspectives in the secondary agricultural programs (Schneider & Suter, 1989).

In order to reach the students, however, the first step is to access the secondary agriscience teachers, and that is the main thrust of this study. There are over 1,500 agriscience teachers in Texas, with an annual enrollment of over 100,000 students (Edney, 1997). If only 10% of that total received a clear explanation of the significance of international perspectives to the social and economic well being of their own communities and state, a decade of high school graduates would revolutionize the Texas agricultural sector.

Chapter 119 of the Texas Essential Knowledge and Skills for Agricultural Science and Technology (TEKS) defines several basic components that teachers are expected to communicate and students are expected to know. These include concepts related to cultural diversity, reasons for promoting trade with other countries, how cultural issues impact marketing practices, and the influence of politics on decisions in international agricultural trade. The introduction to the TEKS states: "If America is to retain her leadership position in world agriculture, she must use high schools to educate and supply well-trained, entry-level employees for business and industry" (Texas Education Agency, 1997).

This study attempted to answer several questions. Do most teachers consider the international perspectives as relevant? How much do teachers know about them? How adequately are they currently being taught? What are the personal, environmental, and institutional factors that have the greatest influence on a Texas agriscience teacher's willingness to teach them? What would it take to motivate teachers to increase the level at which they currently integrate international perspectives into their local programs?

STATEMENT OF THE PROBLEM

A prevailing undercurrent of suspicion and distrust of international matters in the agricultural sector of Texas inhibits participation in export/import markets and offshore agricultural investments. Such a mentality is deeply rooted in the cultural, social, and political conservatism of the rural population, and has been exacerbated by the actual and perceived negative effects of the North American Free Trade Agreement (NAFTA). Perpetuation of this attitude discourages creative inquiry into better ways to circumvent mar-

ket obstacles and establish new investment opportunities. It also translates into considerable economic loss and contributes to social instability in agricultural communities and the state.

Although Texas is already quite prominently represented in international agricultural trade, a closer examination of trade statistics reveals some disturbing trends. From 1994 to 1997, total sales in all exported products to Mexico from Texas increased 40% under NAFTA. Exported agricultural production, however, decreased by 9% and comprised only 4% of total sales (Texas Department of Economic Development [TDED], 1998). Some Texas producers have suffered market losses, causing a psychological backlash toward NAFTA and further reducing participation in trade and offshore agricultural investments. In export sales value from Fiscal Year 1991 to Fiscal Year 1997, the Lone Star state placed 4th behind California, Iowa, and Illinois for all major agricultural exports. Texas' average annual agricultural export sales growth of 8% per year lags behind the national average of 10.9%, while Nebraska (11%) and Kansas (15%) may bump Texas to seventh place by the year 2000 (U.S. General Accounting Office, 1997)

These figures and other indicators imply that a lack of information and motivation inhibits Texans from seeking and supplying potential export and import markets. To be sure, financial and supply capability barriers to entry in the creation and supply of these markets discourage participation on an individual basis by small to medium-sized producers and agribusinesses. Greater understanding of the advantages in consolidating production and identifying niche markets, however, would be enhanced by introducing alternative strategies in high school agricultural programs (P. Rosson, personal communication, April, 1997).

The people and businesses involved in the Texas agricultural sector directly or indirectly influence high school principals, district boards of education, administrators, and state political machinery. Whether their influence drives or restrains the diffusion of international perspectives in the secondary educational system is largely dependent on the conviction among agriscience teachers that teaching such perspectives is just as vital for the future well-being of their students as any of their core curriculum subjects.

The apparent low profile of the international dimension of agriculture is seen even in the main public institutions serving the sector. Other states have taken measures to de-

velop an international consciousness in their agricultural extension agencies (Jones & Munene, 1996; Ludwig, 1991). The growing need to regard other countries as possible clients for agricultural commodities may not be as high a priority as it should be for the Texas Agricultural Extension Service (TAEX). The Texas Department of Agriculture (TDA) budgets only a small staff to promote producer and processor involvement in international markets, leaving the task of investigating and diagnosing trade linkages overseas to the Texas Department of Economic Development. The Texas State Legislature controls the purse strings for educational appropriations. Although state representatives are willing to visit local agricultural programs when invited, most agriscience teachers do not ask for legislative help to fund the promotion of international perspectives because they do not consider the subject to be a priority themselves.

The sustained improvement and implementation of international perspectives is a process that requires a comprehensive and integrated plan of action, with short and long-term coordinated objectives. Past research has identified a number of areas that could potentially drive and restrain integration of international perspectives in high school programs, particularly in the teaching environment (McCracken & Magisos, 1989; Morales & Miller, 1994). There has been little emphasis, however, on specific personal and external factors that would motivate or discourage an agriscience teacher from applying the material in their local classroom. Each state is unique in the characteristics that affect its secondary agricultural programs. AGED faculty in Texas seldom advise agriscience teachers during teacher-training that they will need to know about international perspectives. Finally, there is little evidence of support and encouragement for teachers to communicate international concepts from public and private stakeholders outside the teaching environment. On the contrary, some stakeholders may inadvertently contribute to resistance toward such concepts.

Failure to assess and understand these factors properly in the unique context of state, regional, and local school conditions could seriously jeopardize a future promotional effort. Such a plan must identify all the forces that may impact the goal and evaluate their relationships to each other and the magnitude of restraining forces that require special strategies to overcome. Without an experienced subjective appraisal and a quantitative perceptual assessment of the forces involved, efforts to implement a plan may misdirect

financial, informational, and human resources. At the present time, there is no base from which to design such a plan. Thus, the need existed for conducting this study.

PURPOSE AND OBJECTIVES

The main purpose of the study was to analyze the forces affecting the improvement and implementation of international agricultural perspectives in the secondary level programs of agricultural science in Texas. To accomplish this purpose, the following objectives were proposed:

1. Define the current status of teaching international perspectives in Texas secondary level agricultural programs.
2. Develop a list of factors that would influence a Texas agriscience teacher's willingness to integrate international perspectives into his or her local program.
3. Estimate the relative strength of each factor and the relationships between factors.
4. Evaluate the impact of these factors on the implementation of international perspectives.

Based upon completion of those objectives, three additional goals were established for the study:

1. Develop a list of strategies that would enhance the positive effect and reduce the negative effect of the factors influencing implementation.
2. Develop a plan of action for managing a program for the improvement and implementation of international perspectives in Texas secondary level agricultural programs.
3. Consider how the teacher survey and the force field analysis concept could be used as a diagnostic model for defining forces and prescribing strategies for implementation of international perspectives in a single teacher program, a multi-teacher program, or a program for a group of schools in a district with complementary attributes.

THEORETICAL BASE

The theoretical base for the design of the research and to accomplish the purpose and objectives described above was derived from a review of the literature. A theoretical system is designed to explain a set of phenomena (Borg & Gall, 1989). The theoretical base for this study is force field analysis.

The basic representation of a force field in Figure 1 below facilitates the explanation of its utility as a tool to explain the behavior of teachers, the educational system, communities, the agricultural sector, and selected organizations toward improving and implementing international perspectives in Texas secondary level agricultural programs.

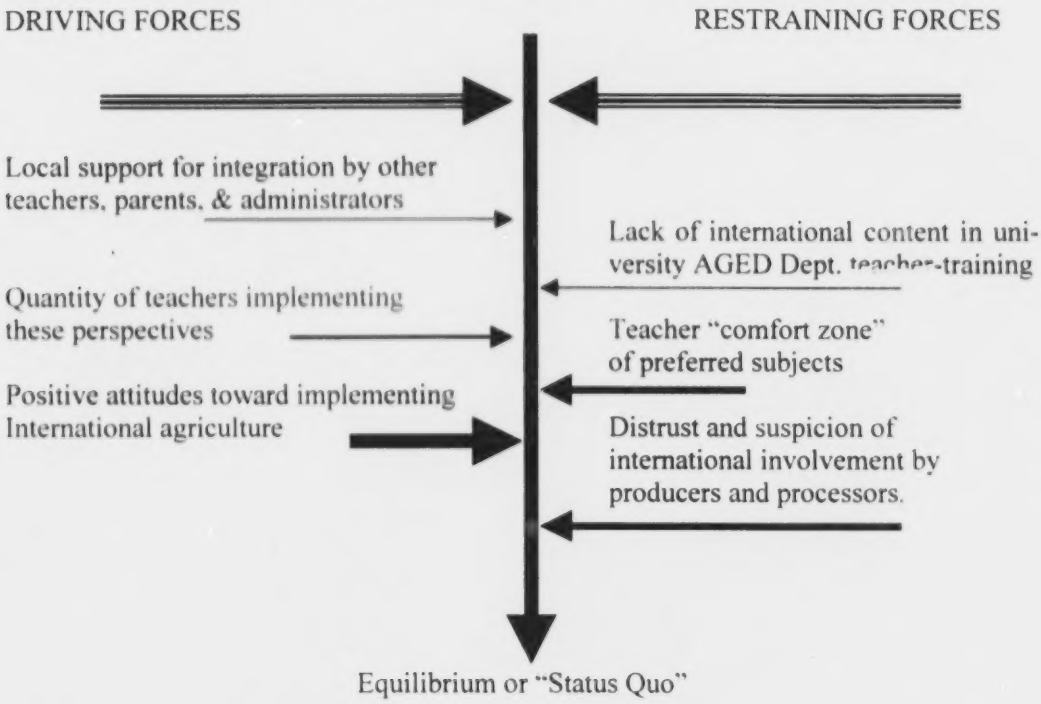
DRIVING FORCES
RESTRAINING FORCES
Local support for integration by other teachers, parents, & administrators
Lack of international content in university AGED Dept. teacher-training
Quantity of teachers implementing these perspectives
Teacher "comfort zone" of preferred subjects
Positive attitudes toward implementing International agriculture
Distrust and suspicion of international involvement by producers and processors.
Equilibrium or "Status Quo"

Figure 1. A portrayal of forces at work in a force field analysis

Note: Width of arrows represents relative strength of the force, and the length of the arrow represents the relative number of teachers who are on that side of the force field.

Dr. Kurt Lewin at the Massachusetts Institute of Technology pioneered the concept of force field analysis in the 1940s as part of his research into group dynamics, as a means for resolving resistance to change in institutional settings. It derives from Lewin's

own definition of "field theory," which is "best characterized as a method of analyzing causal relations and of building scientific constructs" (Lewin, 1951).

Force Field Analysis emphasizes the importance of the fact that any event is the resultant of a multitude of factors. "The recognition of the necessity of a fair representation of this multitude of interdependent factors is a step in the direction of force field analysis." It provides for the blending of qualitative as well as quantitative information to arrive at a balanced assessment of the strength of factors and their relative impact on the goal in mind (Lewin, 1951). This is accomplished by subjective interpretation of statistical data by the parties involved in the analysis.

The following statements were set forth as being essential to the application of force field analysis to the research and for the formulation of working hypotheses and research questions; thus they constitute the theoretical base for the study.

1. A valid means for evaluating the status of implementing international perspectives in the Texas secondary level agricultural programs does not exist. (The vertical line in the middle of the field, called the "equilibrium," represents the status quo of teaching these perspectives, based on the Texas agriscience teachers' perceived adequacy of implementation of the sixteen selected perspectives.)
2. The factors accounting for the position of the equilibrium being in its current position are called "forces" because they individually or collectively exert a certain degree of influence on the Texas agriscience teacher's disposition to integrate international perspectives.
3. Teachers' perceptions of the effect of these forces on their disposition to teach international perspectives vary in quantity (number of teachers), nature (positive and negative), and intensity (relative strength). Force field analysis permits a visual characterization of these perceptual variations.
4. The classification by relative strength permits the discrimination of scores in terms of potential synergies and interactions between and among the forces. For example, there is a cumulative restraining effect borne out of the fact that agriscience teachers and university-AGED departments collectively (if not consciously) continue to ignore international perspectives in agricultural education.
5. Force field analysis provides the thought processes by which proponents of inte-

grating international perspectives can evaluate the present state of implementation based on the forces involved, then proceed to develop short and long term strategies that will shift the equilibrium in the most efficient and cost effective manner.

6. Psychological forces manifested in personal attitudes toward international perspectives are a dominant influence on whether or not a teacher willingly integrates such content into their program.
7. Local traditions and social pressures affect the agriscience teacher's current implementation of international perspectives.
8. Texas agriscience teachers ignore or inadequately implement international perspectives vital to the stimulation of better cultural awareness and the successful transaction of international trade because they consider them as irrelevant.
9. A teacher's disposition to teach international perspectives in their local program depends in part on the exposure to such concepts in teacher-training, friendships with international students, and involvement in international activities .
10. Implementation is influenced by the teachers' perceptions of the support or resistance within their local teaching environment.
11. Interest in international perspectives and the propensity to teach them differs with the experience of the teacher (tenure), and by the geographic area of the state.
12. Texas agriscience teachers are more likely to promote an international agriculture curriculum that strongly emphasizes state and local applications.
13. Texas agriscience teachers are more likely to promote an international agriculture curriculum that is perceived as a complementary supplement to (rather than competing with) existing domestic curriculum, and that adds another interesting dimension to (instead of distracting from) subjects within the teacher's "comfort zone."
14. Organizations outside the teaching environment have substantial influence as sources of information, training, and funding, as influences on school policy, and for endorsements of such curriculum.

HYPOTHESES

Based on the theoretical base described above, the researcher hypothesized that the following forces and composite forces currently had no influence on the Texas agris-

cience teacher's perceived adequacy of implementation of international perspectives:

1. Perceptions of the relevance (meaningfulness, usefulness) of the sixteen selected international perspectives to the Texas agriculture sector
2. Knowledge about the sixteen selected international perspectives
3. Tenure (years of teaching experience)
4. Groupings by Teaching Area
5. Personal attitudes toward international agriculture, expressed as effects of:
   - Intrusion on Teacher's "Comfort Zone"
   - Exposure Prior to College or University Preparation.
   - Personal Global Orientation
   - Cultural Awareness
   - Media & Professional Journals
   - International Travel & Language Experiences
6. Undergraduate preparation (teacher-training)
7. The teaching environment, expressed as effects of:
   - The Texas Education Agency
   - In-service training & workshops
   - Local support for globalizing the secondary agricultural curriculum
   - Support from the local agricultural sector
   - Local impact of NAFTA
   - Human resources
   - Other resources
   - Instructional Materials Service
8. Organizations outside the teaching environment, expressed as effects of their influence, 1) on the teacher's decision whether or not to implement international perspectives; 2) as sources of information and training; 3) on school policy; 4) on funding; and, 5) as endorsers of teaching these perspectives in high school agricultural programs

The researcher further hypothesized that the following selected strategies would have no impact on Texas agriscience teachers to teach international perspectives beyond

their current adequacy of implementation:

1. Increased academic credit for the introductory course of World Agricultural Science and Technology
2. Development of an Internet web-site to provide agriscience teachers with more resources for teaching international perspectives
3. Instructional materials that reflect Texas conditions and apply directly to the Texas agricultural economy
4. An "integrated" curriculum rather than a "stand-alone" curriculum
5. In-service training by distance education
6. Working committees of teachers to secure support from public and private stakeholder groups
7. Scholarships for agriscience teachers to attend the International Livestock Congress sponsored by the Houston Livestock Show and Rodeo
8. Greater participation by university AGED departments to develop a stronger international focus in their mission statements and in the design of international content in their teacher-training programs
9. More guidance for producers in international marketing and effective competition under NAFTA by the Texas Agricultural Extension Service

RESEARCH QUESTIONS

From the theoretical base and hypotheses described above, the following research questions were developed:

1. What is the current level of implementation of international content in Texas secondary agricultural classes?
2. How much is implementation a function of the teacher's perception of the relevance and his or her current knowledge of the perspective?
3. What are the primary forces that affect the current level of teaching international perspectives in Texas secondary level agricultural programs? What are the driving and restraining characteristics of each force, and how do these characteristics compare with findings in previous research?

4. To what extent do personal attitudes toward international perspectives affect implementation in the classroom? How powerful is the perception that such perspectives will distract from traditional core curriculum topics or preferred "comfort zone" subject areas of the teachers?
5. To what degree does undergraduate preparation impact an agriscience teacher's willingness to teach international perspectives? What should be the role of university-based agricultural education departments regarding globalization of their teacher-training programs?
6. How much are agriscience teachers influenced by their teaching environment, the community at large, and the agricultural sector in the localities in which the secondary agriscience teachers currently live and work? Has NAFTA been a driving or restraining force?
7. How much do organizations outside the teaching environment influence the willingness and capacity of teachers to communicate international concepts?
8. What are the interactive relationships, direct and indirect, among and between driving and restraining forces that perpetuate their effect? How can an assessment of those relationships provide clues for the development of strategies to enhance driving elements and reduce restraints?
9. How effective would a force field analysis model be in enabling agriscience teachers and advisors to evaluate their needs and more efficiently stimulate a stronger emphasis on international perspectives in their local environment?
10. Based on the force field analysis, what recommendations can be made to develop a plan of action for promoting international perspectives at various levels (locally, the teaching district, teaching area, and state)?

SIGNIFICANCE AND CONTRIBUTION OF THE STUDY

The following statement from a recent report about the leading factors affecting structural (farm size) change on American farming is particularly appropriate for the Texas agricultural sector. "Perhaps the most important point to recognize is that United States agriculture is an integral part of the world economy. What happens outside our

borders will affect our economy and its evolving agricultural system. The structure of agriculture cannot escape such effects" (Olson & Stanton, 1993).

Secondary agricultural education in Texas should be training people to assimilate specific information on the agricultural situations around the world and to analyze the implications of those situations on the Texas agricultural sector. Currently, this kind of information is the exclusive domain of transnationals and consultants. The promotion of international perspectives in high schools offers the best potential for making these concepts accessible and translatable to the largest number of Texas producers, processors, and agribusiness enterprises.

This study provides a comprehensive assessment of the status of international perspectives in Texas secondary level agricultural programs. It does so first by contributing to a greater understanding and appreciation of the nature and magnitude of the forces involved in driving and restraining the integration of the perspectives. The analysis serves as the basis for a long range plan of action, with recommendations (expressed as strategies) to make these perspectives a permanent component of the standard secondary agricultural education programs in Texas.

The literature review reflects the findings of previous research in other states and provides a view of how other educators and applicators of force field analysis assess the forces. Personal interviews with selected stakeholders in Texas reveal the unique organizational characteristics that effect a promotion of such concepts locally, regionally, and state-wide. Such a baseline will enable interested proponents within the Texas educational system and the agricultural sector to organize and coordinate activities that will gain greater recognition of and demand for better familiarity with these perspectives at every level in the agricultural economy of the state. Finally, the research may provide agricultural educators in other states with new tools to identify and evaluate the influence of forces on the promotion of international perspectives in their own secondary agricultural programs.

The argument for improving and implementing international perspectives in high school agricultural programs is strengthened by assessing their impact on specific conditions in modern society (Wagner and Hollenbeck, 1995).

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THE QUANTITY AND QUALITY OF PRODUCTION

The long-term stimulation of international sales of Texas-grown crops, livestock, and processed agricultural goods is an underlying reason for this study. Changes in quality and quantity of production in other countries will continue to influence the marketability of agricultural products from this country (McCracken, 1995). Texans need to stay a step ahead of other states and nations in this regard in order to take advantage of opportunities.

The need to develop greater skills in identifying alternative markets and to develop a wider variety of agricultural products to meet demand in those markets should motivate Texas producers and agribusiness to consider changing their view of how agricultural education fits into the picture. There may be vested interests in the agricultural sector who do not want competition from the export markets to affect the prices they pay farmers. A larger core of internationally-literate and experienced people spread throughout the state with the capacity to stimulate activity in international agricultural trade would alter the way the game is played. More effective and proactive (instead of reactive) marketing and development strategies could be created by such a core to maximize the participation of the Texas agriculture sector overseas.

ECONOMIC CONDITIONS

In years of bad weather conditions, even international markets cannot guarantee survival, but when domestic demand for agricultural goods limits the market choices farmers have in good years, it would help to know how and where to sell the surplus production overseas. Why wait until things grow worse in the agricultural sector to explore these possibilities?

Major changes have occurred in the level and nature of Texas participation in international agriculture in the past decade alone. Before that time, the "globalization" of agriculture was limited to bulk commodities being shipped from the Port of Houston. Competition from Brazil in soybeans and from China in corn, however, caused a reduction in Texas bulk commodity exports, and the trend has shifted toward consumer-oriented high "value-added" food products; super market items such as snack foods, Tex-Mex, beverages, cereals, and pancake mixes.

POPULATION TRENDS

The world's population, and therefore the potential customer base, is growing steadily. Other non-agricultural industries in Texas are wasting no time to train and equip people to work in that environment. Most of them do not need to speak the language or go there to work; they just need to know what appeals to the foreign markets and how to deliver quality material at competitive prices. The Texas agricultural sector must move decisively to prepare human resources capable of recognizing and developing similar deals, in order to strengthen state and national market competitive capacity.

TECHNOLOGY

The explosion of information accessibility by computer is making it easier for a more diverse spectrum of the population to locate and exploit new market niches and unveil the characteristics of consumers and import regulations in other countries. What is needed now are people familiar with international agricultural concepts to seize the available opportunities before someone else gets there first. An agriculturally literate person is better positioned to be successful in this regard than a MBA with no understanding of the unique characteristics of the products. Agriculture students need to realize that their involvement does not have to end at the farm gate.

INCREASED KNOWLEDGE

As international agricultural perspectives become more familiar to people and their economic implications understood, there will be a dramatic increase in the desire to become more proficient at applying the principles in real-life situations. We need to focus as much as possible on the integration of these perspectives as they harmonize with advances in agricultural research and processed product diversity.

DELIMITATIONS

The study was delimited to the state of Texas and involved 1,563 practicing secondary teachers of agricultural science listed in the 1997-1998 Directory of the Texas Teachers of Agricultural Science and Technology during the 1998 school year.

LIMITATIONS

The findings of this study were subject to the following limitations:

1. Estimates of the present status of international perspectives in Texas secondary agriculture classes were based on information available during the research. Other information may be available of which the researcher was unaware.
2. This study was limited to the circumstances affecting secondary agricultural education in the state of Texas and may not be generalizable to secondary agricultural programs in other states. Low response rates limited the inferences about the status of implementing these perspectives and the effect of the forces to only those teachers who participated in the survey.
2. Texas secondary teachers surveyed varied in their perceptions of the effect of forces on their level of implementing international perspectives due to their differing circumstances, needs, and experience.

ASSUMPTIONS

The following assumptions were made in regard to this study:

1. The interpretations of the data accurately reflect the perceptions of those surveyed.
2. Force field analysis is a suitable means of describing and measuring factors affecting the improvement and implementation of international perspectives in the secondary level agricultural programs of Texas.

METHODOLOGY

The four main objectives of this study were to (1) define the current status of implementation of international perspectives, (2) develop a list of factors that influence implementation, (3) estimate the relative strength of and relationships between factors, and (4) evaluate the impact of these factors on the current level of implementation.

DESIGN OF THE STUDY

The design and conduct of the study was determined by the central purpose, objectives, and the provisions of the theoretical base. The study is based on the correlational method of research in which the emphasis is on understanding the cause-and-effect patterns among variables in which conditions do not easily permit experimental manipulation (Borg & Gall, 1989). In the context of force field analysis, this method facilitates the identification and description of the relationships between forces in the field and the current level of implementing international perspectives in Texas secondary level agricultural programs. All these forces occur naturally without any effort by the researcher to alter their character.

POPULATION

The target population for this study consisted of one fifth of the secondary agriscience teachers (310 teachers), based upon the formula for estimating the sample (Krejcie & Morgan, 1970). The 1997-98 Directory of Texas Teachers of Agricultural Science was the sampling frame for the study.

PROCEDURES

The proposed research was carried out in two major stages. In stage one, the researcher examined previous studies for findings pertaining to the working hypotheses. From that review, and by subjective interviews with secondary agriscience teachers and university-based agricultural educators in Texas, a survey was designed. The survey first determined the perceptions of the agriscience teachers concerning the relevance, and their knowledge and implementation of 16 selected international agricultural perspectives. The bulk of the survey consisted of a series of Likert-style statements to determine the forces that affect the teachers' perceptions of the perspectives in a format that permitted their evaluation by force field analysis. The researcher supplemented the investigation by means of direct contacts with individuals and organizations considered as stakeholders in the goal of improving and implementing international perspectives.

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In the second stage of research, the instrument was distributed by mail during the last two weeks of the spring semester in May and responses were received until the end of July, 1998. To achieve the proper geographic representation in the state, the distribution was stratified according to the number of teachers in each of the ten teaching areas and districts within those areas. The anticipated historical response rate for surveys was 60%, therefore surveys were sent to 520 teachers (every third teacher) to obtain the 310 required for the sample.

In addition to the original mailings in May, 350 reminder postcards were sent out at the end of June to teachers who had not yet responded. As an incentive to attract more participation in the survey, two drawings were held for cash prizes at the end of June and July. Forty copies of the survey were also distributed at a Cooperating Teacher Workshop held at Texas A&M University in early July, and another 200 copies at the Annual Texas Agriscience Teacher Professional Development Conference in late July (involving over 700 teachers). Supplementary publicity concerning the survey was provided in two articles in the February and June editions of a newsletter published by the Vocational Agriculture Teachers Association of Texas (VATAT), and one article in the June Newsletter of the Instructional Materials Service (IMS).

INSTRUMENTATION

The survey was divided into three major sections. Section One included demographic items to identify the teacher's teaching area, years of teaching experience, and the institution from which they received their undergraduate teacher-training. This section contained the list of 16 "Texan-ized" international perspectives shown in Table 1.

The teachers were asked to rank each perspective on a five-point Likert-scale in three ways: 1) their perception of the perspective's relevance to the Texas agricultural economy; 2) how much they felt they know about the perspective; and, 3) how adequately they currently implement the perspective in their own local agricultural programs.

Section Two of the survey consisted of a number of statements requiring a response on a six-point Likert-scale. These statements represented the forces that account for the teachers' current perceptions of the relevance, knowledge, and implementation of international perspectives. The forces were divided into four main categories: 1) Personal At-

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titudes Toward International Agriculture, 2) Undergraduate Preparation, 3) the Teaching Environment, and 4) Organizations Outside the Teaching Environment. In each main category, several statements were consolidated into various composite forces (constructs) designed to capture the effect the forces had from a particular angle within each main category of statements.

Table 1: Sixteen International Perspectives Used in the Teacher Survey

1.	Impact of agricultural imports and exports on employment and income in the production, processing and service areas of the Texas Ag. sector.
2.	Areas of Texas where exported commodities are produced.
3.	Effects of NAFTA on the Texas agricultural sector.
3.	Effects of GATT and the World Trade Organization (WTO) on the Texas agricultural sector.
4.	Types and value of agricultural commodities that Texas exports.
6.	Types and value of agricultural commodities imported to Texas from other countries.
7.	Financial management of agricultural import and export enterprises.
8.	Processing, packaging, and shipping agricultural products overseas
9.	Cultural and economic characteristics of countries with which Texas conducts international agricultural trade.
10.	Causes of food shortage in the developing countries.
11.	Impact of international perspectives on promoting ethnic and racial harmony in Texas and the USA.
12.	Why invest in agricultural development in developing countries?
13.	National and international political influences on agriculture.
14.	Texas' international agricultural trade status compared with other states.
15.	International agricultural trade status of the USA compared with other countries.
16.	Enhancing current domestic agricultural topics through awareness of their international applications.

Section Three of the survey was composed of three parts. The first part asked for the teacher's evaluation of the effectiveness of fifteen strategies to encourage them to move beyond their current level of implementing international perspectives.

The second part requested the teachers to assign a value to each of the composite forces in Section Two of the survey to indicate how strongly each affected their current level of teaching the perspectives. The third part gave teachers the opportunity to estimate the percentage of effect they would attribute to each of the four main categories of forces.

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At the end of the survey, space was provided for teachers to suggest forces and strategies that did not appear in the survey. Because the survey design was completed just at the end of the 1998 spring semester, and the instrument had to be administered before the teachers left their posts, the survey was not piloted and content validity was not assessed by anyone other than the researcher before being distributed by mail. From 520 mailed surveys and 240 surveys distributed at teacher meetings and conferences, a total of 120 were completed and returned for a response rate of 15.8%.

Sixty student-teachers from eight Texas teacher-preparation institutions also completed a student-teacher questionnaire in the spring semester of 1998 to determine their perceptions of the 16 international perspectives and the extent to which their departments of agricultural education were contributing to their understanding of those perspectives.

DATA ANALYSIS

Appropriate statistical measures, determined in consultation with a statistician, were applied to the data, utilizing the Statistical Package for Social Sciences (SPSS). Frequencies, means, standard deviations, and percentages were used to describe the distribution of responses based on selected demographic features and to illustrate the driving and restraining effects of forces on the implementation of international perspectives.

Results were reported using numerical and graphic techniques, including tables, graphs, measures of central tendency, and measures of variability. Separate teacher group responses by tenure, by teaching area, and other selected special groupings were categorized and analyzed for patterns. Throughout the study, a .05 probability level was used to justify the discussion of the impact of selected forces on perceptions and for rejecting or accepting a null hypothesis.

As part of this section on methodology, the researcher considers it is necessary to explain the metamorphosis that the data analysis went through to reach the format finally adopted as the basis of interpretation. As a result of not having an independent assessment of content validity and a piloted version of the survey, both of which would have revealed many of the design weaknesses, it was not apparent until the data analysis phase was well advanced that the instrument's original structure imposed many artificial barriers.

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The main problem with the original structure in terms of statistical management was the fact that the four major categories (Attitude, Undergraduate Preparation, Teaching Environment, and Outside Organizations), together with the numerous composite variables, were all based on the sources of forces affecting implementation, and not on the effects of those forces. For example, it was impossible to get all the statements associated with the AGED teacher-training programs to come together in a single composite variable with a reasonably high internal consistency because they actually constituted a mixture of effects that the programs have on implementation.

Fortunately, the responses to relevance, knowledge, and implementation of the 16 international perspectives at the front end of the survey formed three composite perspective variables with relatively high alpha values for internal consistency: Relevance of Perspectives = .88; Knowledge of Perspectives = .94; and Implementation of Perspectives = .97.

The next step was to disregard completely preconceived categories and constructs in the original survey structure and regroup all 88 Likert-style statements. The theory used for this purpose was that the statements, each of which represents a "force," might consolidate better in composite force variables within the general concepts of relevance and knowledge to help explain the teachers' perceptions of the perspectives in those contexts. Correlations between the composite perspective variables, however, suggested that the sampled teachers' perceptions of the relevance of and their knowledge about the sixteen international perspectives provided insufficient explanation of their adequacy of implementation. To meet this contingency, the researcher theorized that a set of composite force variables focused on the concept of support might supply some of the missing pieces to the puzzle. This support may come from many sources over time, and take on many forms, from funding to simple encouragement from peers.

The choice of which statements would go into each revised composite force variable was made subjectively by the researcher based on the statement's composition and conceptual compatibility to the variable. Every force's influence was taken into consideration according to their collective influence on the composite force variable to which they were assigned. The researcher established the minimum acceptable Chronbach's Alpha value at .70 to assure that a correlation between variables would attain at least a .49 value

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(equivalent to multiplying two alpha values of .70). The outcome of the effort to consolidate statements in this manner was eleven revised composite force variables with the following number of statements and alpha values for internal consistency:

Titles of Composite Force Variables	Number of Forces	Alpha Value
Knowledge gained by personal initiative	12	.75
Knowledge gained from teacher-training	3	.74
Knowledge gained from stakeholders	5	.74
Personal relevance	7	.80
Relevance to the Texas agricultural sector	5	.77
Relevance to the teaching environment	2	.80
Personal support	4	.82
Support within the teaching environment	6	.85
Support from stakeholders on the Teaching environment	4	.74
Support from the Texas agricultural sector	10	.74
General support from all stakeholders	12	.86

The first step toward analyzing the relationship of the eleven revised composite variables to each other and to the three perspective variables of implementation, relevance, and knowledge was to display them all in a conceptual model (Figure 1). The arrows imply the directionality of effects between variables. For the purpose of the analysis, the assumption is that the effect goes only in the direction of the arrows, based on the researcher's estimate of how the forces in each variable relate to each other conceptually and chronologically. The thick double-headed and bracketed arrow between the perspective variables of Relevance and Knowledge signifies that a correlation exists between those variables, but it is not "causal" in nature. Effects between the two are likely to occur, but we cannot say which is the strongest; therefore, for the purpose of the path analysis, it is assumed that they have independent and separate effects on the dependent variable of Implementation of International Perspectives.

For example, Knowledge gained from personal initiative (K1) is impacted by strong correlations (.400 to .500 ⟹) from Knowledge gained from stakeholders (K3) and Personal relevance (R1), and in turn communicates a strong influence on the teacher's perceptions of their knowledge of international perspectives.

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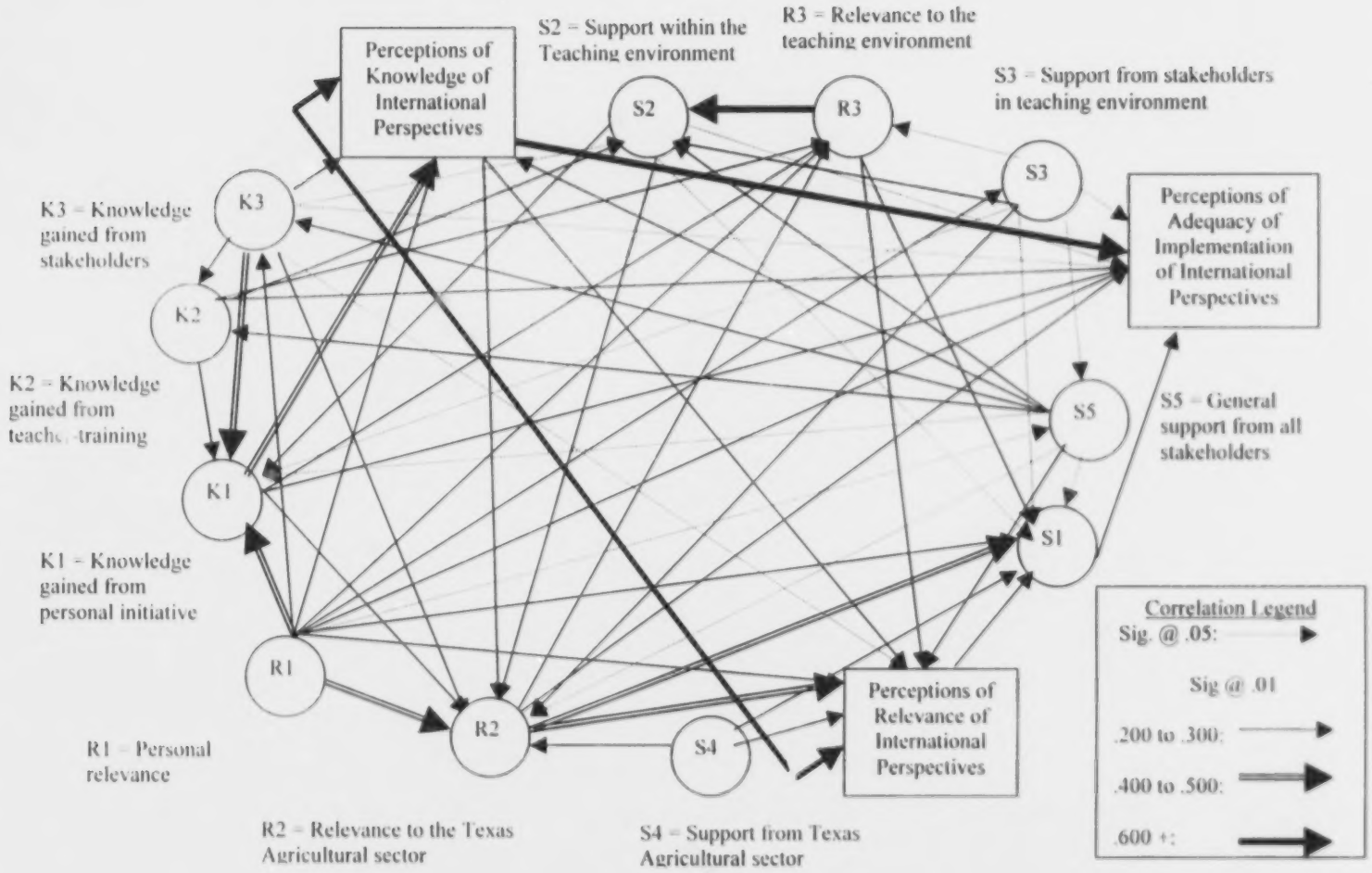

Figure 1. Conceptual model of the directionality of effects between variables affecting the implementation of international perspectives in Texas secondary level agricultural programs, 1998 (N = 120)

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The second step to illustrate the character of the forces contained in each of the revised composite variables was to display data in analytical tables, such as the analytical table below (Table 2) on knowledge gained from personal initiative. The analytical table facilitated the evaluation of each force in terms of the mean score of the force's effect on teaching international perspectives given to it by teachers on the six to one Likert scale, the standard deviation of scores, and the distribution of teachers' scores above, at, and below the value of 4 on the Likert scale, which signified "somewhat agree". The table also shows the zero order correlation of the force with the dependent variable of implementation, and the mean scores on implementation of international perspectives for teachers scoring below 4 and those scoring equal to 4 or better on the force. Finally, the force field diagram on the right side of the table depicts whether the mean score for the force by all teachers was weighted to the left (indicating a driving effect) or right (indicating a restraining effect) of the mid-point of 3.5.

In general, Table 2 indicated that Texas agriscience teachers tended not to participate in activities requiring personal initiative to gain knowledge about international perspectives. The zero order correlation of this composite variable with implementation (.274) was significant at the .01 level, and was considered to be a major restraining factor in future attempts to improve and implement international content in Texas high school agricultural programs. The table also demonstrates the capability of force field analysis to increase the researchers' ability to discern causality by magnifying the driving and restraining effects embedded within the data. Being able to measure such effects enables the researcher to suggest effective strategies for enhancing the former and reducing the latter.

Although 29 Likert-style statements in the survey were internally inconsistent with all of the final 11 composite force variables, many of them still provided useful supplemental descriptive information. Because of the changes in the configuration of statements, parts two and three of section three of the survey were not included in the revised data analysis.

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Table 2. Forces Affecting Knowledge Gained by Personal Initiative (Reported by Texas Secondary Teachers of Agriculture, 1998, N=119)

Number of Force from Survey and Adapted Statement	Item Mean	Std. Dev.	Distribution			Corr. with Imp.	Means on Imp. for teachers scoring >4 & = 4 on force	Force Field of Means Above or Below 3.5
			>4	4	<4			4.5 4 3.5 3 2.5
60. Familiarity with local Ag. export & import activity	3.87	1.22	34	47	36	.267**	>4/3.11; = 4/2.69	60.
78. Existing IMS Int'l. Ag. materials adequate for needs	3.59	1.30	29	40	46	.022	>4/2.58; = 4/2.85	78.
77. Utilize Int'l. Ag. resources other than IMS or FFA	3.25	1.65	33	20	63	.185*	>4/2.88; = 4/2.99	77.
65. Current NAFTA coverage is thorough and unbiased	3.23	1.24	14	45	58	.242**	>4/2.80; = 4/3.00	65.
79. Regularly use Int'l. Ag. materials published by IMS	3.21	1.38	19	36	61	.195*	>4/2.87; = 4/3.07	79.
83. IMS Int'l.Ag. materials rank high for preferred information.	2.97	1.36	15	27	73	.201*	>4/2.60; = 4/3.21	83.
3. High school Ag. teacher emphasized Int'l. Ag. topics	2.47	1.30	6	26	86	.123	>4/2.21; = 4/3.00	3.
32. Took non-ag international courses in college	1.96	1.00	5	5	109	.071	>4/2.68; = 4/2.98	32.
31. Took Ag. courses with international content in college	1.92	.94	3	5	110	.114	>4/2.90; = 4/3.01	31.
36. Participated in Int'l.-oriented clubs & activities in college	1.90	1.12	6	4	107	.096	>4/2.75; = 4/3.22	36.
67. Invite guest speakers from other countries to class.	1.81	1.18	7	6	105	.037	>4/2.72; = 4/3.16	67.
71. State politicians spoke to class about Int'l. Ag. trade	1.66	.90	3	3	112	.117	>4/3.13; = 4/3.31	71.
			>= 3.5		<3.5		(>= 3.5)	90% Restrainers
Summary for Variable K1	2.65	.64	12		108	.274**	2.93	

* Significant at the .05 level ; ** Significant at the .01 level

Topographic Sketch of Force field

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Application of Path Analysis

As is recognized in all statistical analyses, correlation alone will not explain cause and effect (Borg & Gall, 1989). Although the size and statistical significance of first order correlations between variables in the conceptual model imply the strength of their relationship and the arrows suggest directionality, it is still very unclear which variables have the greatest influence on and explain the variability in implementation. As one of the strongest tools in the kit of correlational research, Path Analysis brings order to thought processes concerning what affects implementation of international perspectives by defining the degree of influence that each main variable has on the others in terms of explanatory power.

The methodology involved subjecting all the variables to a process of elimination by applying a series of multivariate general linear regressions. The purpose of the regressions was to isolate progressively the independent variables that had the greatest influence on the dependent variable, in this case, on perceptions about the adequacy of implementation of international perspectives.

The elimination process began by regressing the dependent perspective variable of Implementation on all other variables in the study that had a statistically significant correlation (significant at the .05 level) with it. Separate regression models were then run on each variable that emerged in the regression model with a statistically significant t-value. The minimum level of confidence (.05) for the t-values selected as the cut-off point was intended to protect the researcher from committing a Type I error (wrongly rejecting a true null hypothesis) or a Type II error (wrongly accepting a false hypothesis). It also assured greater objectivity in the interpretation of the relationships of the variables to one another.

The sample regression model in Table 3 below is provided to show how the regression should be interpreted. Subsequent regressions were interpreted using the same principles. The sample model was actually the second one in the Path Analysis. The first model established that the perspectives variable of Knowledge was the only variable with a direct effect on Implementation. Knowledge then became the dependent variable to be run on the seven independent variables with zero order correlations significant at the .05 level with Knowledge that qualified them for inclusion in the regression.

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The reason Table 3 is used to illustrate Path Analysis is the fact that it revealed the variable of Knowledge gained by personal initiative (K1) to be the only one of the seven variables used in the model to have a direct effect on Knowledge. The Summary of Research has already described this variable in the context of the conceptual model and analytical Table 2. It is now possible to see its strategic importance in the distillation of all the variables considered in the study.

Table 3. Tests of Significance and Path Coefficients for the Regression of Knowledge on Selected Independent Variables (N = 117)

Independent Variable (Source of Effect)	Path Coefficient	t-value
Knowledge Gained by Personal Initiative (K1)	.309	3.072*
Relevance (Perceptions of the Relevance of International Perspectives)	.135	1.400
Relevance to the Texas Agricultural Sector (R2)	.131	1.292
General Support from All Stakeholders (S5)	.108	1.288
Knowledge Gained from Stakeholders (K3)	.104	1.126
Personal Relevance (R1)	.066	.674
Support from Stakeholders in the Teaching Environment (S3)	.001	.017

Note: F-Value of the Regression Model = 7.606 $R^2 = .328$

*Significant at the .05 level

The path coefficients (or beta values) for variables with statistically significant t-values are particularly important because they reflect the power of the independent variable to explain the variance in the dependent variable. "Specifically, the beta coefficient indicates the difference in a dependent variable associated with an increase (or decrease) of one standard deviation (SD) in an independent variable – when controlling for the effects of other independent variables" (Vogt, 1999). In other words, if Texas agriscience

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teachers more consistently exercised their initiative to gain knowledge through the forces described in analytical Table 2, they may be able to reduce the variability in those activities by one standard deviation. In doing so, they would eliminate a third of the variablility in the knowledge they gain about international perspectives. The improvement in knowledge would, in turn, have a correspondingly positive effect on the degree of implementation.

The regression exerts this type of "control" within the Path Analysis by evaluating every variable to determine if it can contribute something else to explain the variance in the dependent variable. The results of the regression model in Table 3 indicated that none of the other independent variables could add anything that knowledge gained by personal initiative had not already covered. The R^2 value, however, validated that the effects of all those variables together explained (or predicted) 32.8% of the variance in the current Knowledge of international perspectives.

The F-value of the model determines if the model itself was statistically significant. In the case of the regression model of Knowledge on selected independent variables in Table 3, the F-value of 7.606 substantiates that "the random sample of respondents being analyzed was drawn from a population in which the multiple correlation was not equal to zero and that any observed multiple correlation was not due to sampling fluctuation" (Ladewig, 1977).

A Simplified Path Model

The development of a path model begins with the assumption that variables linked along the route are statistically correlated. If that is not the case, then a change in the independent variable cannot be assumed to influence change in the dependent variable. All path coefficients found to be statistically significant with Implementation of international perspectives are represented in the simplified path model in Figure 2, which is much less complex than the conceptual model in Figure 1. Final path coefficients (betas) and R^2 values for in the simplified model were developed by regressing the dependent variables in each of the preceding regression models on only those independent variables that emerged as statistically significant in each model.

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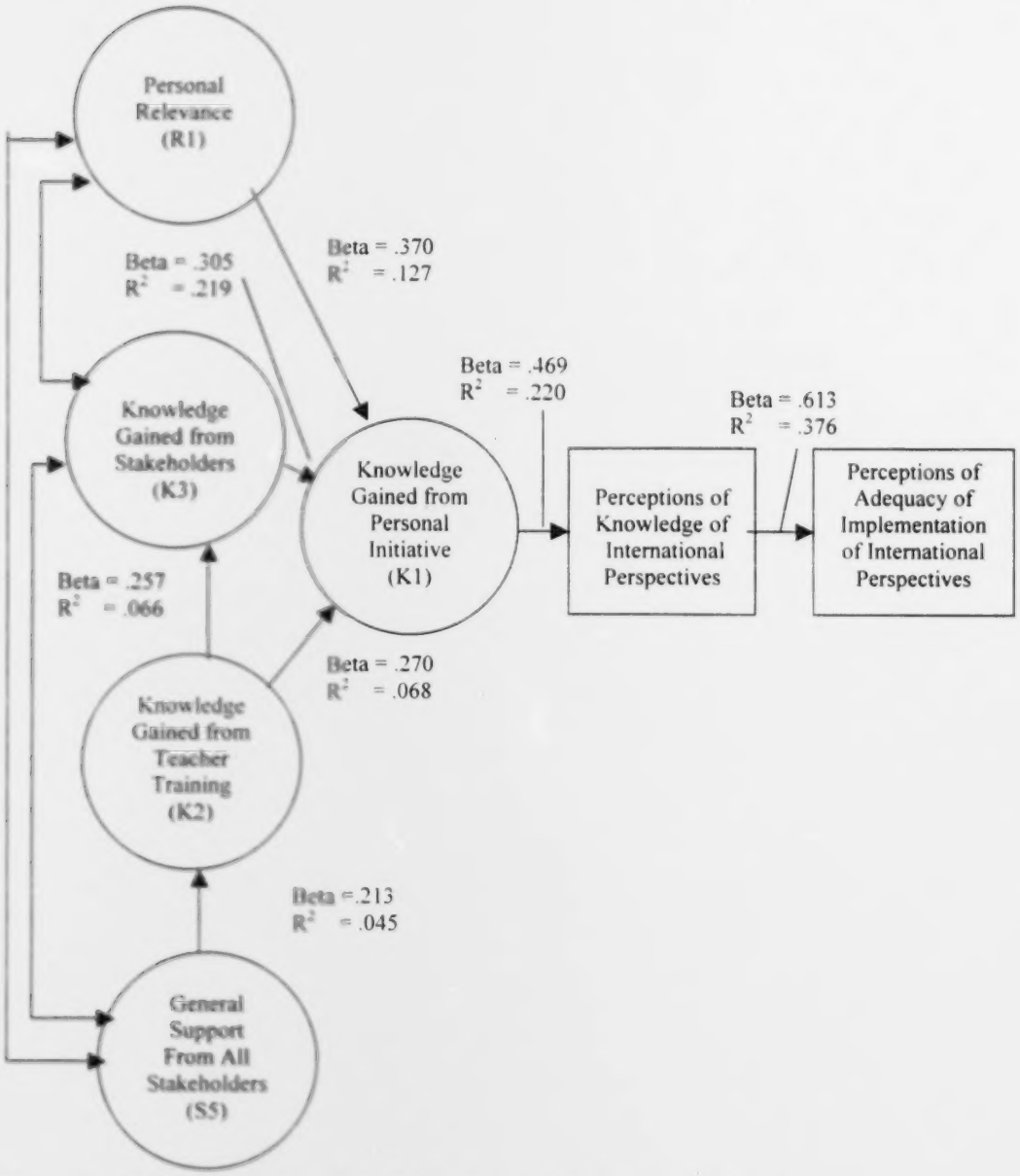

Figure 2. Simplified path model of the effects of selected variables on implementation

Note: Bracketed double-headed arrow lines indicate correlation, but not causality among the variables.

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It should be observed, however, that this process had the effect reducing the R^2 value of the variables that emerged in the simplified model. For example, the R^2 for all variables in Table 3 was 32.8%, but the R^2 for Knowledge gained from personal initiative alone was only 22%, so there was some loss in information caused by the reduction in model complexity. Although the path coefficients generally increase in the final regressions to indicate that unit changes in the standard deviations of the independent variables will bring about greater reductions in the variability of the dependent variables, there is a corresponding loss in the ability of the independent variable to predict variation. Despite this disadvantage, Path Analysis enabled the researcher to identify the main effects on the teachers' degree of implementation of international perspective. Once that was done, it was much easier to focus strategies and interventions on issues that would have the greatest driving effect on improving and implementing those perspectives in the Texas secondary level agricultural programs.

Summary Comments on the Data Analysis

Although the revised analysis cannot make up for missing statements that might have provided more diagnostic and predictive capacity to the study, the reorganized format enabled the researcher to describe and explain more reliably the sampled teachers' current implementation of international agricultural perspectives in their classrooms.

Unfortunately, the low response rate and measurement error caused by ambiguity in the original composition of statements and variables severely limited the researcher's ability to generalize the conclusions to the larger population of agriscience teachers in Texas or to predict their behavior to proposed strategies intended to increase the implementation of international perspectives.

Paradoxically, the interpretation of the data by one researcher (especially one who has never been an agriscience teacher) is inconsistent with the emphasis on group dynamics inherent in force field theory. To extract the deeper significance of the information, interpretation of the data should have been carried out with the participation of several experienced teachers.

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CONCLUSIONS AND IMPLICATIONS, STRATEGIES, AND RECOMMENDATIONS

This section presents the principal findings from the study, conclusions and implications drawn from the findings, specific strategies for promoting international perspectives, general recommendations for applying those strategies, and suggestions for further research.

FINDINGS RELATED TO SPECIFIC OBJECTIVES

OBJECTIVE NUMBER ONE: *Define the current status of teaching international perspectives in Texas secondary level agricultural programs.*

The mean score for their adequacy of implementation was 2.72, on a scale of five to one, signifying that implementation of international perspectives ranges between adequate to inadequate.

OBJECTIVE NUMBER TWO: *Develop a list of factors that would influence a Texas agriscience teacher's willingness to integrate international perspectives into his or her local program.*

The variable composed of responses to the adequacy of implementation of 16 selected international perspectives was considered to be the dependent variable. There were thirteen independent composite variables. The first two were based on perceptions of the Relevance of and Knowledge about the same 16 perspectives. The three variable containing forces affecting perceptions of relevance were personal relevance, relevance to the teaching environment, and relevance to the Texas agricultural sector. The three variables containing forces affecting knowledge were knowledge gained by personal initiative, knowledge gained from teacher-training, and knowledge gained from stakeholders. The five variables containing forces affecting support were personal support, support within the teaching environment, support from stakeholders in the teaching environment, support from the Texas agricultural sector, and general support from all stakeholders.

All variables and selected items within the variables were examined for their correlation to implementation and the size of their standard deviations. The distribution of

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the responses on either side of the mid-point was given and displayed on mini-force fields to reveal the net driving and restraining effect of each variable and its items.

OBJECTIVE NUMBER THREE: *Estimate the relative strength of each factor and the relationship between factors.*

This step involved subjecting all variables to a Path Analysis to determine which variables had the most influence on implementation while controlling for the effects of all other variables. Knowledge of international perspectives was the only variable with a direct effect on implementation. Other statistically significant variables had only indirect effects on implementation by virtue of the fact that they must go through Knowledge to have an impact on Implementation. In the final regression model, the beta coefficient for Knowledge was .613, which means that a change of one standard deviation in Knowledge would yield a change of .613 in the standard deviation of Implementation. It also explained 37.6% of the variability in Implementation. The mean for Knowledge for all teachers was 3.14 or barely over the mid-point for "some knowledge." The force field for Knowledge indicated that about half the teachers felt they were knowledgeable or very knowledgeable on only two of the sixteen international perspectives; Item 5, regarding the types and values of agricultural goods exported from Texas, and Item 2, about areas of Texas where exported commodities are produced.

Knowledge gained by personal initiative was the only statistically significant variable with a direct effect on Knowledge. It had a beta value of .469, which means that if efforts to increase knowledge through personal initiative succeed in reducing this variable's standard deviation by one full unit, the effect will be to reduce the variability in the knowledge base about international perspectives by almost half. On the other hand, this variable in the simplified model only explained 22% of the variability in Knowledge. The mean for the whole variable of 12 items was 2.65, indicating a general failure on the part of most teachers to assert their personal initiative to learn more. Only one item, familiarity with local agricultural export and import activity, stood out with a net driving effect. Less than 20% of the teachers were active participators in the use of international topics published by the Instructional Materials Service of Texas A&M University, outside resources, and their coverage of NAFTA.

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Three variables were identified as having significant influence on knowledge gained through personal initiative. In order by their final beta values, they were personal relevance (.370), knowledge gained from stakeholders (.305), and knowledge gained from teacher-training (.270). Collectively, they explained 41.4% of the variability in knowledge gained by personal initiative. If the standard deviations of each were reduced by one full unit, the effect would be almost to eliminate the variability in the standard deviation in knowledge gained by personal initiative. At the present time, unfortunately, the means for knowledge gained from stakeholders (2.50) and for knowledge gained from teacher-training (2.54) reveal that restraining effects predominate in these important variables.

Under knowledge gained from stakeholders, less than 12% of the teachers invited representatives from Texas public agencies associated with agriculture to speak to their classes about international agriculture. Although 32% of teachers had heard about the National FFA's Global Vision video, fewer teachers have shown it to their classes or used the instructional materials that come with the video.

Under knowledge gained from teacher-training, less than 8% of the teachers could say with any conviction that the university-level departments of agricultural education in Texas were supportive of globalizing the teacher-training programs. The same low number perceived that the departments encouraged presentations by international students, and even fewer felt that international agriculture was thought of as a focus of the AGED department where they received their teacher-training.

Personal relevance for international perspectives fared slightly better with a mean of 3.39 to reflect the positive effect of radio and TV while growing up and the habit of reading international articles in newspapers and magazines as adults. Teachers whose parents had an interest in international affairs and who took courses with international content in high school also tended to implement somewhat better. Personal relevance was, however, the only one of the three relevance force variables to indicate a significant indirect effect on implementation. Even the main perspective variable, in which teachers expressed relatively high regard for the relevance of international perspectives (3.79), failed to have a meaningful effect on implementation. In terms of the strength of first

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order correlation between variables, the study showed that the knowledge variables directly impacted the relevance variables, not the reverse.

The influence of teacher-training does not stop with its direct effect on knowledge gained by personal initiative. It also had a direct effect on knowledge gained from stakeholders. This relationship indicates that some teachers saw the connection between academic theory and practical application of international perspectives in the agricultural sector during college, and that understanding has enhanced the knowledge benefits they currently derive from stakeholders.

The beta value for stakeholder support on teacher-training, however, was only .213 and the R^2 predicted only 4.5% of the variability in knowledge gained through teacher-training. These figures indicate that secondary agricultural education in Texas has barely scratched the surface of the potential for stakeholders to enrich the teachers' understanding of international perspectives. Unfortunately, neither group seems to be very active in trying to make it any better. None of the other four support variables came close to having a significant effect on implementation or on the variables that survived the Path Analysis process. The balance of the objectives and goals listed with the purpose of this study are considered, together with related findings, within the context of conclusions, implications, and strategies.

CONCLUSIONS AND IMPLICATIONS

The major conclusions from the study are directly associated with an evaluation of the impact of the variables on the implementation of international perspectives. To assist in this evaluation, the force field in Figure 3 was developed to reflect the current status of the matter, based upon the character of forces as described in the analytical tables and force fields for each revised composite variable and the distillation of those forces in the Path Analysis. Note that there are only weakly positive effects on the driving side of the force field. The hidden significance of conditions on the driving side is that most of the sampled agriscience teachers still did not believe that teaching these perspectives will make any real difference in the lives of their students nor will knowing more about the topics do anything to improve the economic prosperity of the sector.

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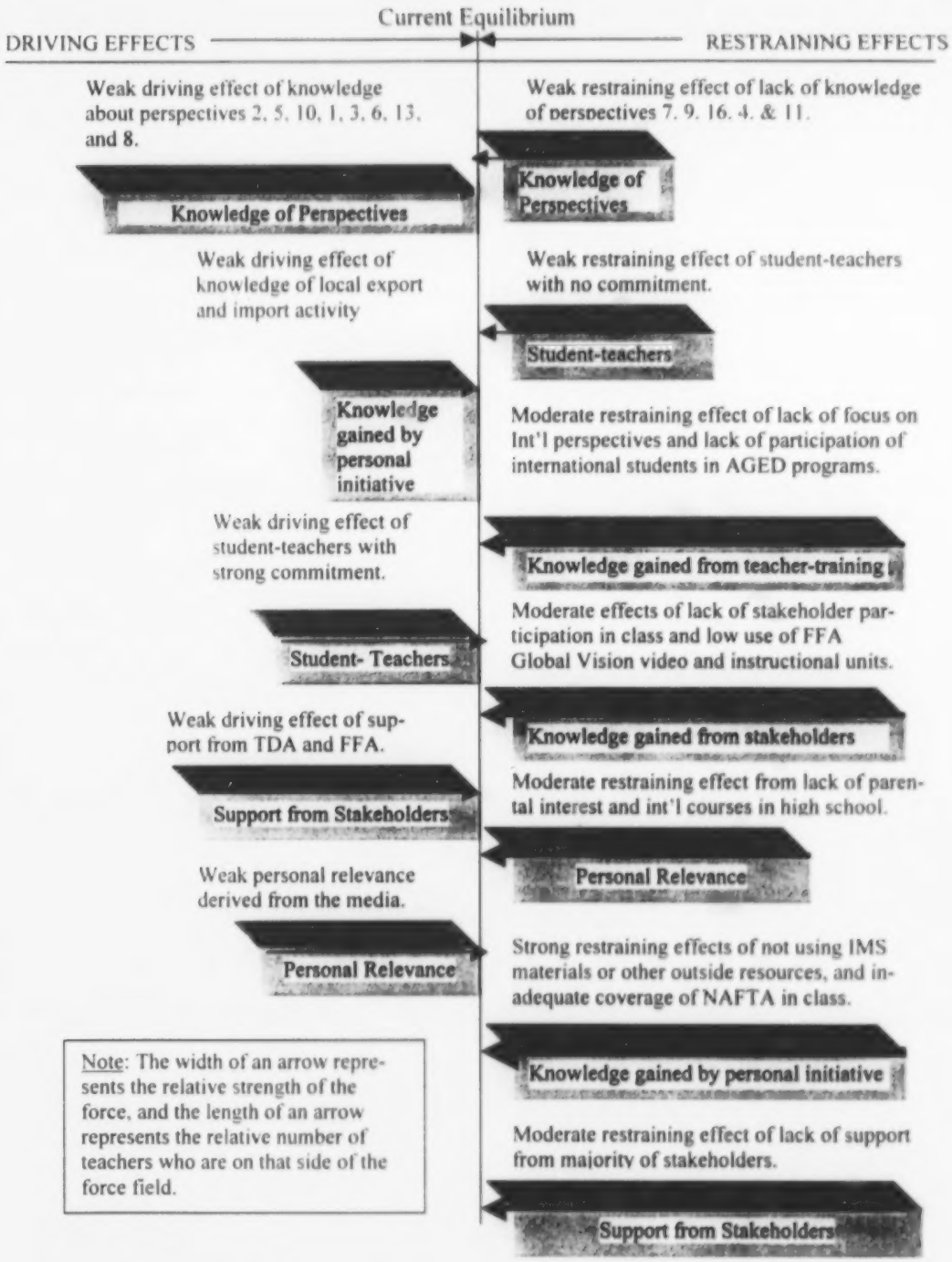
Current Equilibrium
DRIVING EFFECTS
RESTRAINING EFFECTS
Weak driving effect of knowledge about perspectives 2, 5, 10, 1, 3, 6, 13, and 8.
Knowledge of Perspectives
Weak restraining effect of lack of knowledge of perspectives 7, 9, 16, 4, & 11.
Knowledge of Perspectives
Weak driving effect of knowledge of local export and import activity
Weak restraining effect of student-teachers with no commitment.
Student-teachers
Knowledge gained by personal initiative
Moderate restraining effect of lack of focus on Int'l perspectives and lack of participation of international students in AGED programs.
Weak driving effect of student-teachers with strong commitment.
Knowledge gained from teacher-training
Moderate effects of lack of stakeholder participation in class and low use of FFA Global Vision video and instructional units.
Student- Teachers
Weak driving effect of support from TDA and FFA.
Knowledge gained from stakeholders
Moderate restraining effect from lack of parental interest and int'l courses in high school.
Support from Stakeholders
Weak personal relevance derived from the media.
Personal Relevance
Strong restraining effects of not using IMS materials or other outside resources, and inadequate coverage of NAFTA in class.
Personal Relevance
Note: The width of an arrow represents the relative strength of the force, and the length of an arrow represents the relative number of teachers who are on that side of the force field.
Knowledge gained by personal initiative
Moderate restraining effect of lack of support from majority of stakeholders.
Support from Stakeholders

Figure 3. Force field of current implementation of international perspectives in Texas secondary level agricultural programs, 1998

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On the other side of the force field, there is a vast array of restraining forces that seriously limit progress toward the improvement and implementation of international perspectives. Foremost among them are:

1. The effects of not using IMS materials or outside resources, which in turn reduces the accuracy with which teachers can discuss something like NAFTA.
2. Moderate restraints issuing from a failure of the university-level departments of agricultural education to contribute effectively to their student-teachers' knowledge base about how international agriculture impacts the state's economy.
3. A lack of support from stakeholders, which is related to the lack of their participation in high school agricultural classes to discuss the real-life applications of international perspectives. For the most part, stakeholders are perceived by teachers as being unaware that a need even exists to stimulate interest in international perspectives in the high school agricultural programs.
4. Although some restraints are attributable to the lack of initiative by the teachers themselves, others point to a serious communication gap between the teachers and stakeholders who have the greatest potential to improve the knowledge base.
5. Throughout the Path Analysis, issues surrounding knowledge formed the root cause for poor implementation of international perspectives. The virtual absence of driving effects from perceptions of relevance in the path should be a clear warning to promoters of international perspectives that they should not place too much reliance on what teachers say about these subject areas. The real proof is in what they know and practice in the classroom.
6. Figure 4 is a cross-sectional or topographic view of the force field in Figure 3. The point along the adverse slope on the right labeled as the Point of Stability is more conceptual than founded on tangible estimates. It simply says that many forces of restraint must be overcome across the entire spectrum of knowledge and support to secure a permanent place for international perspectives in the regular secondary level agricultural curriculum of Texas.

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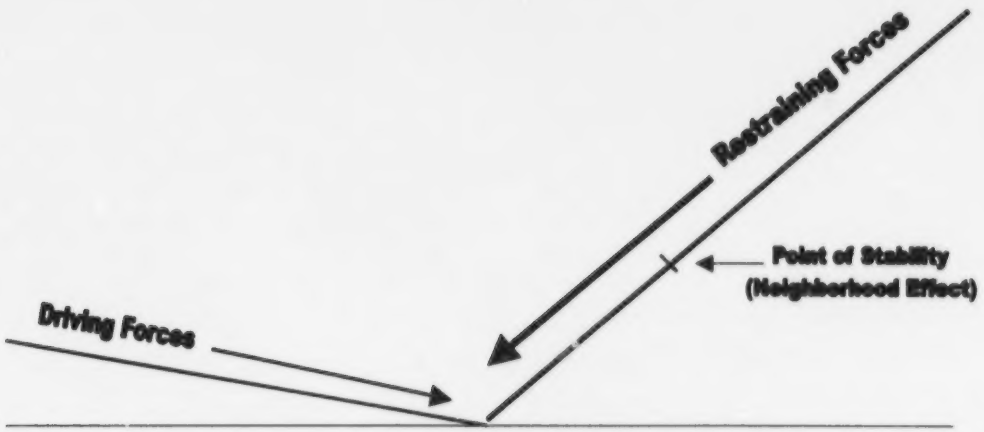

Figure 4. Topographic representation of force field of current implementation of international perspectives in Texas secondary level agricultural programs, 1998

The study supported the null hypothesis that the following issues had no influence on Texas agriscience teacher's perceived adequacy of implementation of international perspectives:

1. Perceptions of the relevance of the sixteen selected international perspectives for the Texas agricultural sector.
2. Intrusion on the teachers' "comfort zone."
3. Cultural awareness.
4. International travel and language experiences.
5. In-service training and workshops.
6. Local support (in the teaching environment) for globalizing the secondary agricultural curriculum.
7. Local impact of NAFTA.
8. The Texas Education Agency.
9. Teacher location by teaching area (no significant differences to the .05 Level).
10. Personal global orientation (related to relevance).

The study also demonstrated that the null hypothesis was rejected for the following issues that were shown to have a statistically significant effect (direct or indirect) on the perceived adequacy of implementation of international perspectives by Texas agriscience teachers.

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1. Knowledge about the sixteen selected international perspectives.
2. Media and professional journals.
3. Instructional Materials Service (IMS).
4. Undergraduate preparation (teacher-training).
5. Support from the local agricultural sector.
6. Organizations outside the teaching environment (stakeholders).
7. Exposure to international perspectives prior to college.
8. Other resources (written) and Human resources (guest speakers in class).
8. Tenure (years of teaching).

STRATEGIES

The text of the strategies and recommendations were considerably abbreviated for the Summary of Research. Greater detail may be found in the full text of the dissertation.

The researcher proposed that the plan incorporate the strategies described in this section. The strategies were designed to enhance teachers' exposure to and assimilation of international perspectives while addressing concerns that were reflected in restraining responses to these variables.

Strategies for Agriscience Teachers

1. Avoid creating polarization within the system through any implication that those who are reluctant to participate are the "bad guys" or "resistors" to the change.

2. Identify cases of compatibility in attitude toward teaching international perspectives among teachers in district or teaching area. Prepare them to offer peer support to teachers who are skeptical about the effect of the material on their programs.

3. Blend international perspectives into regular domestic agriculture subjects instead of treating them as a separate curriculum.

Strategies for In-Service Workshops

1. Give "driving teachers" with some background and success in applying international perspectives in their own local programs the opportunity to present their own ideas and responsibility for organizing the workshop program.

2. Communicate examples of successful delivery techniques and information from

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other sources (such as those developed by the National Council for Agricultural Education and FFA).

3. Teacher-training institutions should be encouraged to participate in and contribute to (but not control) workshop development.

4. Invite participation by Texas producers and exporters who conduct business in international agricultural trade.

5. Use workshops as a forum for filling out and interpreting a modified version of the teacher survey as a way to plan interventions and experiment with teaching methods with greater chances of success.

Strategies for Greater Student Involvement

1. Sponsor a "FFA International Knowledge Curriculum Contest." There might be one winning student from each teaching area, and the prize would be a week-long tour of agricultural development in Mexico for the whole group of winners.

2. Stage a Texas High School International Agricultural Trade Conference, at which student representatives from around the state would meet for an entire weekend to defend and attack NAFTA's and GATT's effect on Texas agriculture, and discuss how the Texas agricultural sector could increase its competitive edge in both marketplaces.

Strategies Related to the Instructional Materials Service (IMS)

1. Evaluate what they already have in print to estimate if their material provides adequate coverage of the subjects teachers perceived in the teacher survey to be most critical.

2. Be guided in international curriculum development by what experienced practitioners in international trade recognize as the most essential skills and knowledge.

3. Collaborate with the Texas Agricultural Extension Service (TAEX) to rewrite the topics on international agriculture that appear on the agency's web-site for easier understanding by high school students. Make topics available for downloading by agriscience teachers from the IMS website.

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Strategies Involving Texas University-Level Departments of Agricultural Education

1. Heads and faculty of these departments need to reassess their policies and practices regarding the emphasis on international agriculture in their teacher-training programs.

2. Target the FFA Global Vision video as something that every block of student-teachers should see and be given time to discuss.

3. Identify practicing agriscience teachers in their jurisdiction who actively integrate international content and invite them to come to speak to the student-teachers.

4. Invite international students as guest speakers in classes of student-teachers to create better cultural awareness and encourage them to invite international students to their schools when they become practicing agriscience teachers.

5. Bring in representatives from the agricultural sector who are currently involved in international trade to describe to student-teachers how these concepts are actually applied in the day-to-day business life of the sector.

6. Identify student-teachers with a special interest for international issues students and give them the opportunity to help develop a stronger emphasis among their peers during teacher-training.

Strategies Involving the Houston Livestock Show and Rodeo (HLSR)

1. Propose to the HLSR International Committee that a portion of the scholarship funds be targeted at encouraging students with a particular interest in promoting international agricultural perspectives to enroll in teacher-training programs.

2. Pursue contacts with the International Stockman's Educational Foundation to earmark several future travel fellowships to the annual International Stockman's Congress specifically for agriscience teachers.

Strategies Involving the Vocational Agriculture Teachers Association of Texas (VATAT)

1. Work with the Executive Director of VATAT to identify individuals who have a high degree of credibility in the Texas agricultural sector to formulate concrete proposals for the political and financial support of initiatives to promote international perspectives in Texas secondary agricultural programs.

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2. Use VATAT as the medium through which teachers and school districts could make contacts in the Texas State Legislature and to investigate how other educational entities have successfully gained legislative support for special educational purposes.

Strategies Related to the USDA/ FAS & FFA

1. Work with the FFA and the Foreign Agricultural Service (FAS to establish criteria that would provide a certain number of internships for college students enrolled in teacher-training programs.

2. In collaboration with the Texas Department of Agriculture, FAS and the FFA should design a special "International Agricultural Road Tour" using FAS interns who would visit high school programs to demonstrate how Texas producers and processors are learning the ropes of international trade.

STRATEGY-BUILDING TOOLS AND PROGRAM MANAGEMENT

The study contains special sections related to the principles of strategy building and a discussion on the merits of managing a promotional program via a decentralized diffusion system that is flatter and less hierarchical in preference to conventional "top-down" centralized diffusion systems that are typical of public educational frameworks. The details of these sections were omitted from this summary, but readers are encouraged to review them in the main study if interested in participating in a serious promotional effort.

RECOMMENDATIONS FOR FUTURE STUDY

"The force field analysis process cannot be said to be complete until the change process itself has either succeeded or been abandoned" (Brager & Holloway, 1992). The present study is, at best, only the first step in the process of determining what needs to be done to stimulate the implementation of international perspectives in Texas secondary agricultural programs. It will be up to the next researcher to continue the information gathering and interpreting process.

The researcher first recommends that the survey design used in this study be revised. Statements should be shorter and more focused to reduce measurement error and

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reduce variance in dependent and independent mean scores from that source. From those statements, stronger (more internally consistent) constructs could be developed that more accurately identify the driving and restraining effects of forces on relevance, knowledge, support, and implementation.

A second major research recommendation involves experimenting with the revised survey as a diagnostic tool that teachers could use to evaluate how to integrate international perspectives into their own programs and what would be the receptivity of their students to doing so. The initial investigation should be conducted as close as possible to the beginning of the academic year. The original survey and responses to the class interview would be the baseline or pre-test. The post-test would consist of a follow up survey and second class interview at the end of the school year. The main objective of the research would be to determine if the survey diagnosis and investigation of student perceptions toward international agriculture would contribute to stimulating greater implementation of the perspectives.

EPILOGUE

Is an increased emphasis on international agricultural perspectives in Texas secondary level agricultural programs really a concept whose time has not come, or is it a case of failure by stakeholders and teachers alike to recognize the role these programs can play in stimulating cultural awareness and international trade? The researcher contends that the study has established the fact that a critical mass of teachers currently exists with the interest, energy, capacity, and desire to build international perspectives into the fabric of Texas secondary agricultural education. The study has also demonstrated that the teachers themselves do not perceive most stakeholders as being effective sources of support or inspiration for these perspectives to be communicated at the high school level. Existing institutions and private sector participants lack the shared vision and cohesiveness to provide a framework in which agriscience teachers would be encouraged to move forward. Under current circumstances, there appears to be no one who will "champion" the matter aggressively. The researcher can only hope that the study will trigger more discussion and lead to an alliance among teachers and stakeholders that will eventually focus resources to that end.

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